



**Generation Interconnection
Feasibility Study Report
for
Queue Project AG1-281
CLAYSBURG-HCR TAP 46 KV
12 MW Capacity / 20 MW Energy**

January 2021

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1 Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Mid-Atlantic Interstate Transmission, LLC (MAIT) (PENELEC Zone).

2 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

3 General

The Interconnection Customer (IC), has proposed a Solar generating facility located in Blair County, Pennsylvania. The installed facilities will have a total capability of 20 MW with 12 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is March 01, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-281
Project Name	CLAYSBURG-HCR TAP 46 KV
State	Pennsylvania
County	Blair
Transmission Owner	MAIT (PENELEC)
MFO	20
MWE	20
MWC	12
Fuel	Solar
Basecase Study Year	2024

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

4 Point of Interconnection

The interconnection of the project at the Primary POI will be accomplished by tapping the Claysburg - Hollidaysburg 46 kV line and constructing a one span tap. The transmission line tap will be located approximately 0.1 miles from Claysburg Substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection line tap and the associated Attachment Facilities. The project will also require upgrades at Claysburg Substation and Hollidaysburg Substation.

Attachment 1 shows a one-line diagram of the proposed primary interconnection facilities for the AG1-281 generation project to connect to the FirstEnergy (“FE”) Transmission System. The IC will be responsible for constructing the facilities on its side of the POI, including the Attachment Facilities which connect the generator to the FE Transmission System’s interconnection facilities.

5 Cost Summary

The AG1-281 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$1,979,000
Total System Network Upgrade Costs	\$161,300,000 ¹
Total Costs	\$163,279,000

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 2016-36, 2016-25 I.R.B. (6/20/2016). If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

¹ This project currently causes and/or contributes to overloads of the Transmission System (see Summer Peak Load Flow Analysis section below) and therefore has potential to have cost allocation for the system reinforcements listed in the report. This will be re-evaluated in the System Impact phase. The results may vary with queue customers withdrawing from the queue and other generators deactivating over time. If a customer is the first to cause the need for a project (causes loading to exceed 100% of rating), then the customer is responsible. If a customer contributes to a facility that is already overloaded by a prior queue, then they may receive cost allocation.

6 Transmission Owner Scope of Work

The interconnection of the project will be accomplished by tapping the Claysburg - Hollidaysburg 46 kV line and constructing a one span tap. The transmission line tap will be located approximately 0.1 miles from Claysburg Substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection line tap and the associated Attachment Facilities. The project will also require upgrades at Claysburg Substation and Hollidaysburg Substation.

The total physical interconnection costs is given in the table below:

Description	Total Cost
Construct a one span tap and install 2-46 kV switches on the Claysburg – Hollidaysburg 46 kV line.	\$914,000
Install 46 kV metering in the interconnection customer's substation.	\$95,000
Upgrade relaying at Claysburg Substation.	\$485,000
Upgrade relaying at Hollidaysburg Substation.	\$485,000
Total Physical Interconnection Costs	\$1,979,000

7 Schedule

Based on the scope of work for the interconnection facilities, it is expected to take a minimum of **24 months** after the signing of an Interconnection Construction Service Agreement and construction kickoff call to complete the installation. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined work and that all system outages will be allowed when requested.

If the customer is ultimately responsible for network upgrades, then the schedule for those upgrades will be refined in future study phases. The customer would need to wait for those upgrades to be completed prior to commercial operation unless determined deliverable by an interim deliverability study. The elapsed time to complete any network upgrades is provided in the System Reinforcements table of this report¹.

8 Transmission Owner Analysis

8.1 Power Flow Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AG1-281 project did not contribute to any overloads on the FE transmission <100 kV system.

9 Interconnection Customer Requirements

9.1 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in FE's "Requirements for Transmission Connected Facilities" document located at: <http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx>.

Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

The IC has requested a non-standard GSU transformer winding configuration. This transformer is in violation of section 14.2.6 of FE's "Requirements for Transmission Connected Facilities" document and will not be accepted. The GSU transformer must have a delta connection on the high (utility) side.

9.2 Compliance Issues and Interconnection Customer Requirements

The proposed Customer Facilities must be designed in accordance with FE's "Requirements for Transmission Connected Facilities" document located at: <http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx>. In particular, the IC is responsible for the following:

1. The purchase and installation of a fully rated 46 kV circuit breaker to protect the AG1-281 generator lead line. A single circuit breaker must be used to protect this line; if the project has several GSU transformers, the individual GSU transformer breakers cannot be used to protect this line.

2. The purchase and installation of the minimum required FE generation interconnection relaying and control facilities. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.
3. The purchase and installation of supervisory control and data acquisition (“SCADA”) equipment to provide information in a compatible format to the FE Transmission System Control Center.
4. Compliance with the FE and PJM generator power factor and voltage control requirements.
5. The execution of a back-up service agreement to serve the customer load supplied from the AG1-281 generation project metering point when the units are out-of-service. This assumes the intent of the IC is to net the generation with the load.

The IC will also be required to meet all PJM, ReliabilityFirst, and NERC reliability criteria and operating procedures for standards compliance. For example, the IC will need to properly locate and report the over and under voltage and over and under frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and ReliabilityFirst audits. Failure to comply with these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the FE Transmission System.

9.3 Power Factor Requirements

The IC shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading (absorbing VARs) to 0.95 lagging (supplying VARs) measured at the high-side of the facility substation transformer(s) connected to the FE Transmission System.

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

10.2 Meteorological Data Reporting Requirements

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Back Panel temperature (Fahrenheit) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Irradiance (Watts/meter²) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Ambient air temperature (Fahrenheit) - (Accepted, not required)
- Wind speed (meters/second) - (Accepted, not required)

- Wind direction (decimal degrees from true north) - (Accepted, not required)

10.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

<http://www.pjm.com/planning/design-engineering/to-tech-standards/>

11 Summer Peak - Load Flow Analysis

The Queue Project AG1-281 was evaluated as a 20.0 MW (Capacity 12.0 MW) injection tapping the Claysburg to Hollidaysburg 46 kV line in the PENELEC area. Project AG1-281 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-281 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

11.2 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
165773239	200745	26ALLEGHEN	115.0	PENELEC	945670	AF1-232 TAP	115.0	PENELEC	1	PN-P2-2-PN-115-074	bus	160.0	99.24	100.53	DC	2.07
165966764	200745	26ALLEGHEN	115.0	PENELEC	945670	AF1-232 TAP	115.0	PENELEC	1	PN-P2-3-PN-115-35G	breaker	160.0	99.24	100.53	DC	2.07
164996081	999332	KEYSTONE	1.0	PENELEC	200011	KEYSTONE	500.0	PENELEC	4	AP-P7-1-WPP-138-53A	tower	634.0	99.93	100.09	DC	2.21

11.3 Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
166590452	200505	26CLYSBURG	115.0	PENELEC	200525	26SUMMIT	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	252.0	105.33	107.63	DC	5.78
166590472	200744	26SOMERS T	115.0	PENELEC	965880	AG1-457 TAP	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	179.0	107.03	107.49	DC	1.8
166590451	200751	26HILLCLAY	115.0	PENELEC	200752	26HILLTOP	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	282.0	102.91	104.5	DC	4.47
166590439	965880	AG1-457 TAP	115.0	PENELEC	200746	26ROCKWOOD	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	179.0	107.03	107.49	DC	1.8

11.4 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with

network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CON T NAME	Type	Ratin g MVA	PRE PROJEC T LOADIN G %	POST PROJEC T LOADIN G %	AC D C	MW IMPAC T
166205004	200501	26BDFORDN	115.0	PENELEC	960900	AF2-381 TAP	115.0	PENELEC	1	PN-P1-2-PN-115-074-A	operatio n	149.0	102.43	104.28	DC	2.75
166205015	200505	26CLYSBURG	115.0	PENELEC	200525	26SUMMIT	115.0	PENELEC	1	PN-P1-2-PN-115-082	operatio n	252.0	102.89	105.77	DC	7.27
166204870	202637	26PRIDE	115.0	PENELEC	200744	26SOMERST	115.0	PENELEC	1	Base Case	operatio n	133.0	138.61	139.08	DC	1.4
166204888	945670	AF1-232 TAP	115.0	PENELEC	964920	AG1-356 TAP	115.0	PENELEC	1	Base Case	operatio n	133.0	143.57	144.04	DC	1.4
166204832	960900	AF2-381 TAP	115.0	PENELEC	200799	26CEN.CTY	115.0	PENELEC	1	PN-P1-2-PN-115-074-A	operatio n	149.0	161.19	163.03	DC	2.75
166204837	960900	AF2-381 TAP	115.0	PENELEC	200799	26CEN.CTY	115.0	PENELEC	1	Base Case	operatio n	126.0	111.96	113.57	DC	2.04
166204857	964920	AG1-356 TAP	115.0	PENELEC	202637	26PRIDE	115.0	PENELEC	1	Base Case	operatio n	133.0	141.84	142.31	DC	1.4

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
166590451	5	26HILLCLAY 115.0 kV - 26HILLTOP 115.0 kV Ckt 1	<u>PENELEC</u> PN-AF2-F-0041A (2297) : Reconductor 4.5 miles of line Project Type : FAC Cost : \$13,850,000 Time Estimate : 36.0 Months	\$13,850,000
164996081	2	KEYSTONE 1.0 kV - KEYSTONE 500.0 kV Ckt 4	<u>PENELEC</u> PN-AF2-F-0005 (2150) : Construct 500 kV yard consisting of three- 500 kV breakers configured in a breaker-and-a-half layout (initially a ring bus) Tap the Keystone - Conemaugh 500 kV line and loop into the new Homer City 500 kV yard Install one 500/345 kV transformer Install a new 345 kV breaker-and-a-half string using three new breakers Project Type : CON Cost : \$85,600,000 Time Estimate : 48.0 Months	\$85,600,000
166590452	3	26CLYSBURG 115.0 kV - 26SUMMIT 115.0 kV Ckt 1	<u>PENELEC</u> PN-AG1-F-0006A (2169) : Rebuild approximately 11.85 miles of line. Project Type : FAC Cost : \$29,000,000 Time Estimate : 50.0 Months PN-AG1-F-0006B (2170) : Replace bus conductor at Claysburg substation. Project Type : FAC Cost : \$200,000 Time Estimate : 12.0 Months	\$29,200,000
165773239,165 966764	1	26ALLEGHEN 115.0 kV - AF1- 232 TAP 115.0 kV Ckt 1	<u>PENELEC</u> PN-AF2-F-0036A (2161) : Reconductor 1.7 miles of line. Project Type : FAC Cost : \$5,250,000 Time Estimate : 24.0 Months	\$5,250,000
166590472	4	26SOMERST 115.0 kV - AG1- 457 TAP 115.0 kV Ckt 1	<u>PENELEC</u> PN-AG1-F-0008 (2180) : Reconductor approximately 8.1 miles of line. Replace line drops at Somerset Substation. Project Type : FAC Cost : \$20,000,000 Time Estimate : 42.0 Months	\$20,000,000
166590439	6	AG1-457 TAP 115.0 kV - 26ROCKWOOD 115.0 kV Ckt 1	<u>PENELEC</u> PN-AG1-F-0033A (2281) : Rebuild 3 miles of line. Project Type : FAC Cost : \$7,400,000 Time Estimate : 32.0 Months	\$7,400,000
			TOTAL COST	\$161,300,000¹

11.6 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

11.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
165966764	200745	26ALLEGHEN	PENELEC	945670	AF1-232 TAP	PENELEC	1	PN-P2-3-PN-115-35G	breaker	160.0	99.24	100.53	DC	2.07

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200835	26ARN_Z1-066	-0.9129	Adder	-1.07
200846	26FORWARD	0.1669	50/50	0.1669
200864	K-013 E	7.6699	50/50	7.6699
200883	Q-053 E	3.1759	Adder	3.74
200889	26STNY CRK	0.8134	50/50	0.8134
293603	O-018 E	2.4672	Adder	2.9
294903	P-060 E	25.4738	50/50	25.4738
296332	R-032 E	2.8468	Adder	3.35
917673	Z2-108 BAT	2.4165	50/50	2.4165
938352	AE1-053 BAT	1.3425	50/50	1.3425
938993	AE1-128 C	23.8025	50/50	23.8025
938994	AE1-128 E	15.8683	50/50	15.8683
942361	AE2-249 C	2.6778	50/50	2.6778
942362	AE2-249 E	1.7852	50/50	1.7852
944751	AF1-140 C	1.3623	50/50	1.3623
944752	AF1-140 E	0.9082	50/50	0.9082
945673	AF1-232 BAT (Withdrawn : 01/19/2021)	6.2244	50/50	6.2244
957981	AF2-092 C	2.0740	50/50	2.0740
957982	AF2-092 E	1.3826	50/50	1.3826
958472	AF2-141 BAT	2.6850	50/50	2.6850
959792	AF2-270 E	1.2301	50/50	1.2301
960451	AF2-336 C	3.4566	50/50	3.4566
960452	AF2-336 E	2.3044	50/50	2.3044
960461	AF2-337 C	3.4566	50/50	3.4566
960462	AF2-337 E	2.3044	50/50	2.3044
960471	AF2-338 C	3.4566	50/50	3.4566
960472	AF2-338 E	2.3044	50/50	2.3044
960481	AF2-339 C	3.4566	50/50	3.4566
960482	AF2-339 E	2.3044	50/50	2.3044
960901	AF2-381 C	27.0753	50/50	27.0753
960902	AF2-381 E	14.2484	50/50	14.2484
961981	AG1-041 C	1.8509	50/50	1.8509
961982	AG1-041 E	1.2339	50/50	1.2339
962292	AG1-077 E	2.6506	50/50	2.6506
962642	AG1-113 BAT	1.4298	50/50	1.4298
962652	AG1-114 BAT	1.3425	50/50	1.3425
963541	AG1-203 C	4.3073	50/50	4.3073
963542	AG1-203 E	2.3193	50/50	2.3193
964191	AG1-280 C	1.2497	50/50	1.2497
964192	AG1-280 E	0.8331	50/50	0.8331

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
964201	AG1-281 C	1.2391	50/50	1.2391
964202	AG1-281 E	0.8261	50/50	0.8261
964751	AG1-338 C	0.7204	50/50	0.7204
964752	AG1-338 E	0.0982	50/50	0.0982
964761	AG1-339 C	0.7531	50/50	0.7531
964762	AG1-339 E	0.0655	50/50	0.0655
964771	AG1-340 C	0.7204	50/50	0.7204
964772	AG1-340 E	0.0982	50/50	0.0982
G-007A	G-007A	0.3404	Confirmed LTF	0.3404
VFT	VFT	0.9352	Confirmed LTF	0.9352
CALDERWOOD	CALDERWOOD	0.0472	Confirmed LTF	0.0472
PRAIRIE	PRAIRIE	0.2351	Confirmed LTF	0.2351
CHEOAH	CHEOAH	0.0475	Confirmed LTF	0.0475
CBM-N	CBM-N	0.1812	Confirmed LTF	0.1812
COTTONWOOD	COTTONWOOD	0.1953	Confirmed LTF	0.1953
HAMLET	HAMLET	0.0554	Confirmed LTF	0.0554
GIBSON	GIBSON	0.0497	Confirmed LTF	0.0497
BLUEG	BLUEG	0.1597	Confirmed LTF	0.1597
TRIMBLE	TRIMBLE	0.0512	Confirmed LTF	0.0512
CATAWBA	CATAWBA	0.0336	Confirmed LTF	0.0336

11.6.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
164996081	999332	KEYSTONE	PENELEC	200011	KEYSTONE	PENELEC	4	AP-P7-1-WPP-138-53A	tower	634.0	99.93	100.09	DC	2.21

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200636	26IUP CO-G	0.3106	50/50	0.3106
200809	26SITHE	0.9777	50/50	0.9777
200833	26SEWRDB34	10.1584	50/50	10.1584
200835	26ARN_Z1-066	0.6351	Adder	0.75
200837	26HOMER C1	16.8382	50/50	16.8382
200838	26HOMER C2	14.2022	50/50	14.2022
200839	26HOMER C3	15.0349	50/50	15.0349
200846	26FORWARD	0.0631	50/50	0.0631
200852	26WARR RDG	0.1804	Adder	0.21
200864	K-013 E	2.8981	50/50	2.8981
200883	Q-053 E	4.5194	Adder	5.32
200894	26K02	2.9964	Adder	3.53
200906	26KEYSTN#3	0.5123	50/50	0.5123
202158	26CON.GEN1	0.0536	50/50	0.0536
203915	26BF_Z2-108	1.4290	Adder	1.68
203999	P-047 E	5.2749	Adder	6.21
235003	AC1-025 E	0.0762	Adder	0.09
236828	01GRAYMONT	0.2068	Adder	0.24
290086	Q-036 E	3.2150	Adder	3.78
292350	K-023	2.6119	Adder	3.07
292542	L-013 1	2.5405	Adder	2.99
293301	N-039 E	6.0553	Adder	7.12
293393	V3-030E	2.7724	Adder	3.26
293432	R-040 E	0.1429	Adder	0.17
293603	O-018 E	5.3663	Adder	6.31
293902	O-048 E	2.2864	Adder	2.69
294515	O38_P22	5.2984	Adder	6.23
294903	P-060 E	4.1023	Adder	4.83
296332	R-032 E	6.1919	Adder	7.28
913142	Y1-033 E OP1	2.0360	Adder	2.4
916202	Z1-069 E	4.2802	Adder	5.04
919201	AA1-144 OP	8.1689	Adder	9.61
920341	AA2-132 (Withdrawn : 12/07/2020)	1.1100	Adder	1.31
921642	AA2-000	26.0609	Adder	30.66
930511	AB2-092	0.9569	Adder	1.13
931092	AB1-160 E	1.2229	Adder	1.44
935191	AD1-154	1.7214	Adder	2.03
936421	AD2-055	1.9700	Adder	2.32
936991	AD2-133 C	1.4468	Adder	1.7
936992	AD2-133 E	6.6174	Adder	7.79

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
938351	AE1-053	0.7939	Adder	0.93
938881	AE1-116	0.4279	Adder	0.5
938951	AE1-123	1.3126	Adder	1.54
938993	AE1-128 C	7.2504	Adder	8.53
938994	AE1-128 E	4.8336	Adder	5.69
939171	AE1-147 C	0.6223	Adder	0.73
939172	AE1-147 E	0.4149	Adder	0.49
939291	AE1-160 C	0.7951	Adder	0.94
939292	AE1-160 E	0.4570	Adder	0.54
940201	AE2-001 C	0.6213	Adder	0.73
940202	AE2-001 E	0.4142	Adder	0.49
940681	AE2-055 C (Suspended)	0.6062	Adder	0.71
940682	AE2-055 E (Suspended)	0.4041	Adder	0.48
940861	AE2-074 C	1.1793	Adder	1.39
940862	AE2-074 E	1.5524	Adder	1.83
941191	AE2-113 C	4.6819	Adder	5.51
941192	AE2-113 E	5.0409	Adder	5.93
941231	AE2-117 C	0.8766	Adder	1.03
941232	AE2-117 E	0.5844	Adder	0.69
941241	AE2-118 C	0.9156	Adder	1.08
941242	AE2-118 E	0.6104	Adder	0.72
941261	AE2-120 C	0.6208	Adder	0.73
941262	AE2-120 E	0.4138	Adder	0.49
941271	AE2-121 C	0.3317	Adder	0.39
941272	AE2-121 E	0.2215	Adder	0.26
941321	AE2-126 C	0.8211	Adder	0.97
941322	AE2-126 E	0.5474	Adder	0.64
941331	AE2-129 C	0.9029	Adder	1.06
941332	AE2-129 E	0.6019	Adder	0.71
941351	AE2-131 C (Suspended)	0.9029	Adder	1.06
941352	AE2-131 E (Suspended)	0.6019	Adder	0.71
941421	AE2-139 C	1.6147	Adder	3.58
941422	AE2-139 E	1.0765	Adder	2.39
942121	AE2-224 C	5.9486	Adder	7.0
942122	AE2-224 E	3.9658	Adder	4.67
942351	AE2-248 C	0.4900	Adder	0.58
942352	AE2-248 E	0.3267	Adder	0.38
942361	AE2-249 C	0.8157	Adder	0.96
942362	AE2-249 E	0.5438	Adder	0.64
942491	AE2-262 C	2.8016	Adder	3.3
942492	AE2-262 E	1.8827	Adder	2.21
942501	AE2-263 C	2.6335	Adder	3.1
942502	AE2-263 E	1.7583	Adder	2.07
942511	AE2-264 C	3.5655	Adder	4.19
942512	AE2-264 E	2.3770	Adder	2.8
942811	AE2-299 C	1.6198	Adder	1.91
942812	AE2-299 E	6.4790	Adder	7.62
942961	AE2-316 C	2.8632	Adder	3.37
942962	AE2-316 E	4.0830	Adder	4.8
943151	AE2-344 C	3.5376	Adder	4.16
943152	AE2-344 E	2.3584	Adder	2.77
943351	AF1-006 C	0.6066	Adder	0.71

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943352	AF1-006 E	0.3412	Adder	0.4
943711	AF1-039 C O1	0.5386	Adder	0.63
943712	AF1-039 E O1	0.3591	Adder	0.42
943751	AF1-043	5.9101	Adder	6.95
944001	AF1-068 C O1 (Withdrawn : 12/15/2020)	0.6513	Adder	0.77
944002	AF1-068 E O1 (Withdrawn : 12/15/2020)	0.3663	Adder	0.43
944181	AF1-086 C O1	1.9221	Adder	2.26
944182	AF1-086 E O1	8.3620	Adder	9.84
944261	AF1-094 C	0.6509	Adder	0.77
944262	AF1-094 E	0.4339	Adder	0.51
944281	AF1-096 C	0.7512	Adder	0.88
944282	AF1-096 E	0.5008	Adder	0.59
944301	AF1-098 C	2.4953	Adder	2.94
944302	AF1-098 E	1.6636	Adder	1.96
944311	AF1-099 C	4.2528	Adder	5.0
944312	AF1-099 E	2.8352	Adder	3.34
944321	AF1-100 C	9.0512	Adder	10.65
944322	AF1-100 E	6.0342	Adder	7.1
944381	AF1-103 O1	1.2493	Adder	1.47
944411	AF1-106 O1	1.2143	Adder	1.43
944471	AF1-112 C	0.6141	Adder	0.72
944472	AF1-112 E	0.4094	Adder	0.48
944671	AF1-132 C O1 (Withdrawn : 12/15/2020)	0.6094	Adder	0.72
944672	AF1-132 E O1 (Withdrawn : 12/15/2020)	0.4063	Adder	0.48
944691	AF1-134 C	0.9961	Adder	1.17
944692	AF1-134 E	0.6641	Adder	0.78
944751	AF1-140 C	0.9713	Adder	1.14
944752	AF1-140 E	0.6475	Adder	0.76
944771	AF1-142 C	6.8045	Adder	8.01
944772	AF1-142 E	4.5364	Adder	5.34
944781	AF1-143 C	4.7634	Adder	5.6
944782	AF1-143 E	2.5405	Adder	2.99
944881	AF1-153 C O1	0.7715	Adder	0.91
944882	AF1-153 E O1	0.5144	Adder	0.61
944901	AF1-155 C	0.7723	Adder	0.91
944902	AF1-155 E	0.5149	Adder	0.61
945021	AF1-167 C	0.5480	Adder	0.64
945022	AF1-167 E	0.3660	Adder	0.43
945051	AF1-170 C	2.2592	Adder	2.66
945052	AF1-170 E	1.5062	Adder	1.77
945451	AF1-210 C	0.6247	Adder	0.73
945452	AF1-210 E	0.4165	Adder	0.49
945491	AF1-214 C (Withdrawn : 12/03/2020)	0.6208	Adder	0.73
945492	AF1-214 E (Withdrawn : 12/03/2020)	0.4138	Adder	0.49

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945671	AF1-232 C (Withdrawn : 01/19/2021)	10.0643	Adder	11.84
945672	AF1-232 E (Withdrawn : 01/19/2021)	5.4193	Adder	6.38
945751	AF1-240 C O1	1.0329	Adder	1.22
945752	AF1-240 E O1	0.6886	Adder	0.81
946071	AF1-272 C O1	10.6405	50/50	10.6405
946072	AF1-272 E O1	7.0937	50/50	7.0937
946111	AF1-276 C	5.3020	Adder	6.24
946112	AF1-276 E	2.6115	Adder	3.07
946121	AF1-277 C	5.3020	Adder	6.24
946122	AF1-277 E	2.6115	Adder	3.07
946131	AF1-278 C	4.2290	Adder	4.98
946132	AF1-278 E	2.1018	Adder	2.47
946211	AF1-286 C	0.4918	Adder	0.58
946212	AF1-286 E	0.3339	Adder	0.39
946221	AF1-287 C	0.6108	Adder	0.72
946222	AF1-287 E	0.4072	Adder	0.48
946381	AF1-302 C	1.2503	Adder	1.47
946382	AF1-302 E	1.6671	Adder	1.96
946401	AF1-304 C	3.9489	Adder	4.65
946402	AF1-304 E	2.6326	Adder	3.1
946421	AF1-306 C	3.1492	Adder	3.7
946422	AF1-306 E	12.5966	Adder	14.82
946571	AF1-321 C O1	1.5148	50/50	1.5148
946572	AF1-321 E O1	1.0098	50/50	1.0098
946771	AF1-217 C	0.6108	Adder	0.72
946772	AF1-217 E	0.4072	Adder	0.48
957001	AF2-001 C O1	1.5148	50/50	1.5148
957002	AF2-001 E O1	1.0098	50/50	1.0098
957011	AF2-002 C O1	0.7574	50/50	0.7574
957012	AF2-002 E O1	0.5049	50/50	0.5049
957161	AF2-010 C	2.5133	Adder	2.96
957162	AF2-010 E	1.6938	Adder	1.99
957451	AF2-039 C	0.5586	Adder	0.66
957452	AF2-039 E	0.3724	Adder	0.44
957512	AF2-045 E	1.8239	Adder	2.15
957561	AF2-050 C	2.9743	Adder	3.5
957562	AF2-050 E	1.9829	Adder	2.33
957571	AF2-051 C	1.9186	Adder	2.26
957572	AF2-051 E	0.9884	Adder	1.16
957931	AF2-087 C (Suspended)	0.2634	Adder	0.31
957932	AF2-087 E (Suspended)	0.3627	Adder	0.43
957941	AF2-088 C	0.2689	Adder	0.32
957942	AF2-088 E	0.1793	Adder	0.21
957981	AF2-092 C	0.7228	Adder	0.85
957982	AF2-092 E	0.4819	Adder	0.57
958101	AF2-104 C (Withdrawn : 12/08/2020)	0.2282	Adder	0.27
958102	AF2-104 E (Withdrawn : 12/08/2020)	0.1522	Adder	0.18
958271	AF2-121 C	0.9029	Adder	1.06
958272	AF2-121 E	0.6019	Adder	0.71

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
958361	AF2-130 C	0.8397	Adder	0.99
958362	AF2-130 E	0.5598	Adder	0.66
958471	AF2-141	0.6351	Adder	0.75
958731	AF2-164 C O1	3.5855	Adder	4.22
958732	AF2-164 E O1	2.3903	Adder	2.81
958741	AF2-165 C	0.8012	Adder	0.94
958742	AF2-165 E	0.5341	Adder	0.63
958751	AF2-166 C	0.8397	Adder	0.99
958752	AF2-166 E	0.5598	Adder	0.66
959061	AF2-197 C O1	2.0748	Adder	2.44
959062	AF2-197 E O1	3.1122	Adder	3.66
959441	AF2-235 C	0.3756	Adder	0.44
959442	AF2-235 E	0.2504	Adder	0.29
959471	AF2-238 C	0.7482	Adder	0.88
959472	AF2-238 E	0.4988	Adder	0.59
959481	AF2-239 C	0.5578	Adder	0.66
959482	AF2-239 E	0.4472	Adder	0.53
959491	AF2-240 C	0.2295	Adder	0.27
959492	AF2-240 E	0.1955	Adder	0.23
959501	AF2-241 C	0.6861	Adder	0.81
959502	AF2-241 E	0.5282	Adder	0.62
959521	AF2-243 C	0.6009	Adder	0.71
959522	AF2-243 E	0.4006	Adder	0.47
959741	AF2-265 C	0.5362	Adder	0.63
959742	AF2-265 E	0.3990	Adder	0.47
959792	AF2-270 E	0.3747	Adder	0.44
959802	AF2-271 E	0.2272	Adder	0.27
959822	AF2-273 E	0.2466	Adder	0.29
960022	AF2-293 E	0.0605	Adder	0.07
960031	AF2-294 C	0.6693	Adder	0.79
960032	AF2-294 E	0.4462	Adder	0.52
960041	AF2-295 C	0.7723	Adder	0.91
960042	AF2-295 E	0.5149	Adder	0.61
960051	AF2-296 C	0.9961	Adder	1.17
960052	AF2-296 E	0.6641	Adder	0.78
960271	AF2-318 C	0.6030	Adder	0.71
960272	AF2-318 E	0.4020	Adder	0.47
960451	AF2-336 C	1.2047	Adder	1.42
960452	AF2-336 E	0.8031	Adder	0.94
960461	AF2-337 C	1.2047	Adder	1.42
960462	AF2-337 E	0.8031	Adder	0.94
960471	AF2-338 C	1.2047	Adder	1.42
960472	AF2-338 E	0.8031	Adder	0.94
960481	AF2-339 C	1.2047	Adder	1.42
960482	AF2-339 E	0.8031	Adder	0.94
960901	AF2-381 C	10.0778	50/50	10.0778
960902	AF2-381 E	5.3035	50/50	5.3035
961141	AF2-405	0.6072	Adder	0.71
961151	AF2-406	4.5537	Adder	5.36
961201	AF2-411 O1 (Withdrawn : 12/08/2020)	23.1005	Adder	27.18
961211	AF2-412	9.2522	Adder	10.88
961911	AG1-033 C	0.3999	50/50	0.3999

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
961912	AG1-033 E	0.2250	50/50	0.2250
961971	AG1-040 C	0.3421	Adder	0.76
961972	AG1-040 E	0.2281	Adder	0.51
961981	AG1-041 C	0.3822	Adder	0.85
961982	AG1-041 E	0.2548	Adder	0.57
962292	AG1-077 E	0.2058	Adder	0.46
962411	AG1-090 C O1	2.3927	Adder	5.31
962412	AG1-090 E O1	1.5951	Adder	3.54
962511	AG1-100 C	0.3234	Adder	0.72
962512	AG1-100 E	0.2156	Adder	0.48
962641	AG1-113	0.1814	Adder	0.4
962651	AG1-114	0.4208	Adder	0.93
962891	AG1-138 C	0.1762	Adder	0.39
962892	AG1-138 E	0.0093	Adder	0.02
962901	AG1-139 C	0.1681	Adder	0.37
962902	AG1-139 E	0.0088	Adder	0.02
962911	AG1-140 C	0.0483	Adder	0.11
962912	AG1-140 E	0.0220	Adder	0.05
962951	AG1-144 C	0.4785	Adder	1.06
962952	AG1-144 E	0.3190	Adder	0.71
963281	AG1-177 C O1	0.3450	Adder	0.77
963282	AG1-177 E O1	0.2300	Adder	0.51
963441	AG1-193 C	0.4104	Adder	0.91
963442	AG1-193 E	0.2736	Adder	0.61
963481	AG1-197 C	0.2597	Adder	0.58
963482	AG1-197 E	0.1731	Adder	0.38
963491	AG1-198 C	0.2070	Adder	0.46
963492	AG1-198 E	0.1380	Adder	0.31
963531	AG1-202 C	0.1657	Adder	0.37
963532	AG1-202 E	0.0854	Adder	0.19
963541	AG1-203 C	0.3343	Adder	0.74
963542	AG1-203 E	0.1800	Adder	0.4
963561	AG1-205 C	0.2735	Adder	0.61
963562	AG1-205 E	0.1473	Adder	0.33
963571	AG1-206 C	0.2353	Adder	0.52
963572	AG1-206 E	0.1267	Adder	0.28
963881	AG1-241 C	0.8124	50/50	0.8124
963882	AG1-241 E	0.4374	50/50	0.4374
963891	AG1-242 C	0.2860	Adder	0.63
963892	AG1-242 E	0.1540	Adder	0.34
963941	AG1-247 C	0.1577	Adder	0.35
963942	AG1-247 E	0.0837	Adder	0.19
963991	AG1-253 C	0.0724	Adder	0.16
963992	AG1-253 E	0.0349	Adder	0.08
964031	AG1-257 C	0.2256	Adder	0.5
964032	AG1-257 E	0.3153	Adder	0.7
964041	AG1-258 C	0.2256	Adder	0.5
964042	AG1-258 E	0.3153	Adder	0.7
964191	AG1-280 C	0.5974	Adder	1.33
964192	AG1-280 E	0.3982	Adder	0.88
964201	AG1-281 C	0.5965	Adder	1.32
964202	AG1-281 E	0.3977	Adder	0.88

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
964331	AG1-295 C	0.2574	Adder	0.57
964332	AG1-295 E	0.1366	Adder	0.3
964341	AG1-296 C	0.2441	Adder	0.54
964342	AG1-296 E	0.1314	Adder	0.29
964391	AG1-301 C	0.4589	Adder	1.02
964392	AG1-301 E	0.3059	Adder	0.68
964411	AG1-303 C O1	0.8135	Adder	1.81
964412	AG1-303 E O1	0.5423	Adder	1.2
964451	AG1-308 C O1	0.3225	Adder	0.72
964452	AG1-308 E O1	0.4508	Adder	1.0
964701	AG1-333 C	0.1301	Adder	0.29
964702	AG1-333 E	0.0177	Adder	0.04
964751	AG1-338 C	0.2320	Adder	0.51
964752	AG1-338 E	0.0316	Adder	0.07
964761	AG1-339 C	0.2425	Adder	0.54
964762	AG1-339 E	0.0211	Adder	0.05
964771	AG1-340 C	0.2320	Adder	0.51
964772	AG1-340 E	0.0316	Adder	0.07
964911	AG1-355 C	4.0808	50/50	4.0808
964912	AG1-355 E	2.7205	50/50	2.7205
964921	AG1-356 C	1.1040	Adder	2.45
964922	AG1-356 E	0.7360	Adder	1.63
965121	AG1-377 C O1	0.4785	Adder	1.06
965122	AG1-377 E O1	0.3190	Adder	0.71
965131	AG1-378 C O1	0.4785	Adder	1.06
965132	AG1-378 E O1	0.3190	Adder	0.71
965171	AG1-382 C	0.6318	Adder	1.4
965172	AG1-382 E	0.4212	Adder	0.93
965201	AG1-385 C	0.5258	Adder	1.17
965202	AG1-385 E	0.1557	Adder	0.35
965221	AG1-387 C	0.6318	Adder	1.4
965222	AG1-387 E	0.4212	Adder	0.93
965241	AG1-389 C O1	0.4839	Adder	1.07
965242	AG1-389 E O1	0.3226	Adder	0.72
965251	AG1-390 C O1	0.4839	Adder	1.07
965252	AG1-390 E O1	0.3226	Adder	0.72
965261	AG1-391 C O1	0.4839	Adder	1.07
965262	AG1-391 E O1	0.3226	Adder	0.72
965271	AG1-392 C O1	0.9679	Adder	2.15
965272	AG1-392 E O1	0.6453	Adder	1.43
965301	AG1-395 C	0.6149	Adder	1.36
965302	AG1-395 E	0.1826	Adder	0.41
965861	AG1-455	0.9013	Adder	2.0
965881	AG1-457 C	1.4561	Adder	3.23
965882	AG1-457 E	0.9707	Adder	2.15
966121	AG1-481	0.5142	Adder	1.14
966512	AG1-520 E	0.5049	50/50	0.5049
966771	AG1-548 C	3.2711	Adder	7.26
966772	AG1-548 E	0.9956	Adder	2.21
966781	AG1-549 C O1	21.5361	50/50	21.5361
966782	AG1-549 E O1	6.5545	50/50	6.5545
G-007A	G-007A	0.0743	Confirmed LTF	0.0743

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
VFT	VFT	0.3870	Confirmed LTF	0.3870
CALDERWOOD	CALDERWOOD	0.1978	Confirmed LTF	0.1978
PRAIRIE	PRAIRIE	0.9066	Confirmed LTF	0.9066
CHEOAH	CHEOAH	0.1997	Confirmed LTF	0.1997
CBM-N	CBM-N	0.1680	Confirmed LTF	0.1680
COTTONWOOD	COTTONWOOD	0.7875	Confirmed LTF	0.7875
HAMLET	HAMLET	0.2512	Confirmed LTF	0.2512
GIBSON	GIBSON	0.1884	Confirmed LTF	0.1884
BLUEG	BLUEG	0.6145	Confirmed LTF	0.6145
TRIMBLE	TRIMBLE	0.1970	Confirmed LTF	0.1970
CATAWBA	CATAWBA	0.1491	Confirmed LTF	0.1491

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
166590452	200505	26CLYSBURG	PENELEC	200525	26SUMMIT	PENELEC	1	PN-P7-1-PN-230-001	tower	252.0	105.33	107.63	DC	5.78

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUUGH	0.1264	50/50	0.1264
200834	26SW_E13_K22	0.0336	50/50	0.0336
200835	26ARN_Z1-066	1.5990	50/50	1.5990
200846	26FORWARD	0.1318	50/50	0.1318
200864	K-013 E	6.0566	50/50	6.0566
200888	26HIGHLAND	0.3683	50/50	0.3683
200889	26STNY CRK	0.4031	50/50	0.4031
200890	26BF_G21_K23	0.1608	50/50	0.1608
200891	26CSLMN_L13	0.1860	50/50	0.1860
200892	26LOOKOUT	0.1987	50/50	0.1987
200925	26R32	0.5775	50/50	0.5775
202225	26SCI_S29B	0.0672	50/50	0.0672
202652	26RGH_Y1-033	0.1217	50/50	0.1217
203915	26BF_Z2-108	3.5977	50/50	3.5977
292350	K-023	6.5757	50/50	6.5757
292542	L-013 1	6.3958	50/50	6.3958
293432	R-040 E	0.3598	50/50	0.3598
293603	O-018 E	14.9880	50/50	14.9880
293902	O-048 E	5.7563	50/50	5.7563
294903	P-060 E	12.6252	50/50	12.6252
296332	R-032 E	17.2938	50/50	17.2938
913142	Y1-033 E OP1	5.2483	50/50	5.2483
938351	AE1-053	1.9987	50/50	1.9987
938881	AE1-116	1.0644	50/50	1.0644
938993	AE1-128 C	27.0670	50/50	27.0670
938994	AE1-128 E	18.0446	50/50	18.0446
941351	AE2-131 C (Suspended)	-0.9094	Adder	-1.07
942361	AE2-249 C	3.0450	50/50	3.0450
942362	AE2-249 E	2.0300	50/50	2.0300
943711	AF1-039 C O1	1.3884	50/50	1.3884
943712	AF1-039 E O1	0.9256	50/50	0.9256
944751	AF1-140 C	4.9027	50/50	4.9027
944752	AF1-140 E	3.2685	50/50	3.2685
944781	AF1-143 C	11.9922	50/50	11.9922
944782	AF1-143 E	6.3958	50/50	6.3958
945671	AF1-232 C (Withdrawn : 01/19/2021)	28.9266	50/50	28.9266
945672	AF1-232 E (Withdrawn : 01/19/2021)	15.5758	50/50	15.5758
946571	AF1-321 C O1	2.8532	50/50	2.8532
946572	AF1-321 E O1	1.9022	50/50	1.9022

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
957001	AF2-001 C O1	2.8532	50/50	2.8532
957002	AF2-001 E O1	1.9022	50/50	1.9022
957011	AF2-002 C O1	1.4266	50/50	1.4266
957012	AF2-002 E O1	0.9511	50/50	0.9511
957513	AF2-045 BAT	2.6190	50/50	2.6190
957931	AF2-087 C (Suspended)	-0.2402	Adder	-0.28
957981	AF2-092 C	2.9074	50/50	2.9074
957982	AF2-092 E	1.9383	50/50	1.9383
958101	AF2-104 C (Withdrawn : 12/08/2020)	0.5677	50/50	0.5677
958102	AF2-104 E (Withdrawn : 12/08/2020)	0.3785	50/50	0.3785
958471	AF2-141	1.5990	50/50	1.5990
959792	AF2-270 E	1.3988	50/50	1.3988
959803	AF2-271 BAT	0.1233	Merchant Transmission	0.1233
960451	AF2-336 C	4.8457	50/50	4.8457
960452	AF2-336 E	3.2305	50/50	3.2305
960461	AF2-337 C	4.8457	50/50	4.8457
960462	AF2-337 E	3.2305	50/50	3.2305
960471	AF2-338 C	4.8457	50/50	4.8457
960472	AF2-338 E	3.2305	50/50	3.2305
960481	AF2-339 C	4.8457	50/50	4.8457
960482	AF2-339 E	3.2305	50/50	3.2305
960901	AF2-381 C	24.1081	50/50	24.1081
960902	AF2-381 E	12.6869	50/50	12.6869
961911	AG1-033 C	0.6497	50/50	0.6497
961912	AG1-033 E	0.3655	50/50	0.3655
961981	AG1-041 C	3.0536	50/50	3.0536
961982	AG1-041 E	2.0357	50/50	2.0357
962292	AG1-077 E	1.1411	50/50	1.1411
962641	AG1-113	0.8515	50/50	0.8515
962651	AG1-114	1.9987	50/50	1.9987
963541	AG1-203 C	1.8543	50/50	1.8543
963542	AG1-203 E	0.9984	50/50	0.9984
963561	AG1-205 C	1.2992	50/50	1.2992
963562	AG1-205 E	0.6995	50/50	0.6995
963881	AG1-241 C	1.3198	50/50	1.3198
963882	AG1-241 E	0.7106	50/50	0.7106
964191	AG1-280 C	3.5288	50/50	3.5288
964192	AG1-280 E	2.3526	50/50	2.3526
964201	AG1-281 C	3.4664	50/50	3.4664
964202	AG1-281 E	2.3110	50/50	2.3110
964751	AG1-338 C	2.1353	50/50	2.1353
964752	AG1-338 E	0.2912	50/50	0.2912
964761	AG1-339 C	2.2323	50/50	2.2323
964762	AG1-339 E	0.1941	50/50	0.1941
964771	AG1-340 C	2.1353	50/50	2.1353
964772	AG1-340 E	0.2912	50/50	0.2912
964911	AG1-355 C	7.4465	50/50	7.4465
964912	AG1-355 E	4.9643	50/50	4.9643
964921	AG1-356 C	5.8249	50/50	5.8249
964922	AG1-356 E	3.8832	50/50	3.8832
965303	AG1-395 BAT	0.4050	Merchant Transmission	0.4050

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
965881	AG1-457 C	6.8850	50/50	6.8850
965882	AG1-457 E	4.5900	50/50	4.5900
966512	AG1-520 E	0.9511	50/50	0.9511
WEC	WEC	0.0378	Confirmed LTF	0.0378
LGEE	LGEE	0.0785	Confirmed LTF	0.0785
CPL	CPL	0.0935	Confirmed LTF	0.0935
CBM-W2	CBM-W2	1.1290	Confirmed LTF	1.1290
NY	NY	0.2101	Confirmed LTF	0.2101
TVA	TVA	0.1820	Confirmed LTF	0.1820
O-066	O-066	1.4537	Confirmed LTF	1.4537
SIGE	SIGE	0.0357	Confirmed LTF	0.0357
CBM-S2	CBM-S2	1.4198	Confirmed LTF	1.4198
CBM-S1	CBM-S1	0.0490	Confirmed LTF	0.0490
G-007	G-007	0.2195	Confirmed LTF	0.2195
MEC	MEC	0.1939	Confirmed LTF	0.1939
LAGN	LAGN	0.2240	Confirmed LTF	0.2240
CBM-W1	CBM-W1	1.5843	Confirmed LTF	1.5843

11.6.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
166590472	200744	26SOMERST	PENELEC	965880	AG1-457 TAP	PENELEC	1	PN-P7-1-PN-230-001	tower	179.0	107.03	107.49	DC	1.8

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200834	26SW_E13_K22	0.0404	50/50	0.0404
200835	26ARN_Z1-066	-4.1106	Adder	-4.84
200846	26FORWARD	0.1044	50/50	0.1044
200864	K-013 E	4.7966	50/50	4.7966
200888	26HIGHLAND	0.1443	50/50	0.1443
200889	26STNY CRK	0.3137	50/50	0.3137
200925	26R32	0.2262	50/50	0.2262
202225	26SCI_S29B	0.0808	50/50	0.0808
293603	O-018 E	5.8708	50/50	5.8708
294903	P-060 E	9.8259	50/50	9.8259
296332	R-032 E	6.7740	50/50	6.7740
917673	Z2-108 BAT	10.8810	50/50	10.8810
938352	AE1-053 BAT	6.0450	50/50	6.0450
938881	AE1-116	1.2798	50/50	1.2798
938993	AE1-128 C	12.5712	50/50	12.5712
938994	AE1-128 E	8.3808	50/50	8.3808
942361	AE2-249 C	1.4143	50/50	1.4143
942362	AE2-249 E	0.9428	50/50	0.9428
943301	AF1-001 C	-0.8054	Adder	-0.95
944751	AF1-140 C	1.1050	50/50	1.1050
944752	AF1-140 E	0.7367	50/50	0.7367
945671	AF1-232 C (Withdrawn : 01/19/2021)	26.1706	50/50	26.1706
945672	AF1-232 E (Withdrawn : 01/19/2021)	14.0918	50/50	14.0918
946571	AF1-321 C O1	2.5591	50/50	2.5591
946572	AF1-321 E O1	1.7061	50/50	1.7061
957001	AF2-001 C O1	2.5591	50/50	2.5591
957002	AF2-001 E O1	1.7061	50/50	1.7061
957011	AF2-002 C O1	1.2796	50/50	1.2796
957012	AF2-002 E O1	0.8530	50/50	0.8530
957981	AF2-092 C	1.1585	50/50	1.1585
957982	AF2-092 E	0.7723	50/50	0.7723
958101	AF2-104 C (Withdrawn : 12/08/2020)	0.6826	50/50	0.6826
958102	AF2-104 E (Withdrawn : 12/08/2020)	0.4551	50/50	0.4551
958472	AF2-141 BAT	12.0900	50/50	12.0900
959792	AF2-270 E	0.6497	50/50	0.6497
960451	AF2-336 C	1.9308	50/50	1.9308
960452	AF2-336 E	1.2872	50/50	1.2872

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960461	AF2-337 C	1.9308	50/50	1.9308
960462	AF2-337 E	1.2872	50/50	1.2872
960471	AF2-338 C	1.9308	50/50	1.9308
960472	AF2-338 E	1.2872	50/50	1.2872
960481	AF2-339 C	1.9308	50/50	1.9308
960482	AF2-339 E	1.2872	50/50	1.2872
960901	AF2-381 C	16.1695	50/50	16.1695
960902	AF2-381 E	8.5092	50/50	8.5092
961911	AG1-033 C	0.5102	50/50	0.5102
961912	AG1-033 E	0.2870	50/50	0.2870
961981	AG1-041 C	1.0866	50/50	1.0866
961982	AG1-041 E	0.7244	50/50	0.7244
962292	AG1-077 E	0.9841	50/50	0.9841
962641	AG1-113	1.0239	50/50	1.0239
962652	AG1-114 BAT	6.0450	50/50	6.0450
963541	AG1-203 C	1.5991	50/50	1.5991
963542	AG1-203 E	0.8611	50/50	0.8611
963881	AG1-241 C	1.0364	50/50	1.0364
963882	AG1-241 E	0.5581	50/50	0.5581
964191	AG1-280 C	0.4902	Adder	1.09
964192	AG1-280 E	0.3268	Adder	0.73
964201	AG1-281 C	0.4872	Adder	1.08
964202	AG1-281 E	0.3248	Adder	0.72
964751	AG1-338 C	0.5317	50/50	0.5317
964752	AG1-338 E	0.0725	50/50	0.0725
964761	AG1-339 C	0.5559	50/50	0.5559
964762	AG1-339 E	0.0483	50/50	0.0483
964771	AG1-340 C	0.5317	50/50	0.5317
964772	AG1-340 E	0.0725	50/50	0.0725
964911	AG1-355 C	6.5111	50/50	6.5111
964912	AG1-355 E	4.3407	50/50	4.3407
964921	AG1-356 C	5.5797	50/50	5.5797
964922	AG1-356 E	3.7198	50/50	3.7198
966512	AG1-520 E	0.8530	50/50	0.8530
G-007A	G-007A	1.0909	Confirmed LTF	1.0909
VFT	VFT	2.9993	Confirmed LTF	2.9993
CALDERWOOD	CALDERWOOD	0.1605	Confirmed LTF	0.1605
PRAIRIE	PRAIRIE	0.7594	Confirmed LTF	0.7594
CHEOAH	CHEOAH	0.1617	Confirmed LTF	0.1617
CBM-N	CBM-N	0.5844	Confirmed LTF	0.5844
COTTONWOOD	COTTONWOOD	0.6489	Confirmed LTF	0.6489
HAMLET	HAMLET	0.1981	Confirmed LTF	0.1981
GIBSON	GIBSON	0.1583	Confirmed LTF	0.1583
BLUEG	BLUEG	0.5086	Confirmed LTF	0.5086
TRIMBLE	TRIMBLE	0.1631	Confirmed LTF	0.1631
CATAWBA	CATAWBA	0.1186	Confirmed LTF	0.1186

11.6.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
166590451	200751	26HILLCLAY	PENELEC	200752	26HILLTOP	PENELEC	1	PN-P7-1-PN-230-001	tower	282.0	102.91	104.5	DC	4.47

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	0.2238	50/50	0.2238
200834	26SW_E13_K22	0.0596	50/50	0.0596
200835	26ARN_Z1-066	2.8370	50/50	2.8370
200840	26DEEPCRK1	0.1921	50/50	0.1921
200841	26DEEPCRK2	0.1940	50/50	0.1940
200846	26FORWARD	0.2356	50/50	0.2356
200864	K-013 E	10.8267	50/50	10.8267
200883	Q-053 E	7.3843	50/50	7.3843
200888	26HIGHLAND	0.7062	50/50	0.7062
200889	26STNY CRK	0.5401	50/50	0.5401
200890	26BF_G21_K23	0.2853	50/50	0.2853
200891	26CSLMN_L13	0.3301	50/50	0.3301
200892	26LOOKOUT	0.3525	50/50	0.3525
200915	26CHSTN_FL	0.1553	50/50	0.1553
200925	26R32	1.1072	50/50	1.1072
202225	26SCI_S29B	0.1193	50/50	0.1193
202652	26RGH_Y1-033	0.2157	50/50	0.2157
203915	26BF_Z2-108	6.3832	50/50	6.3832
292350	K-023	11.6670	50/50	11.6670
292542	L-013 1	11.3478	50/50	11.3478
293432	R-040 E	0.6383	50/50	0.6383
293603	O-018 E	28.7352	50/50	28.7352
293902	O-048 E	10.2131	50/50	10.2131
294903	P-060 E	16.9163	50/50	16.9163
296332	R-032 E	33.1560	50/50	33.1560
913142	Y1-033 E OP1	9.3014	50/50	9.3014
938351	AE1-053	3.5462	50/50	3.5462
938881	AE1-116	1.8896	50/50	1.8896
938993	AE1-128 C	27.5472	50/50	27.5472
938994	AE1-128 E	18.3648	50/50	18.3648
942361	AE2-249 C	3.0991	50/50	3.0991
942362	AE2-249 E	2.0660	50/50	2.0660
943711	AF1-039 C O1	2.4607	50/50	2.4607
943712	AF1-039 E O1	1.6405	50/50	1.6405
944751	AF1-140 C	3.0816	50/50	3.0816
944752	AF1-140 E	2.0544	50/50	2.0544
944781	AF1-143 C	21.2772	50/50	21.2772
944782	AF1-143 E	11.3478	50/50	11.3478
945671	AF1-232 C (Withdrawn : 01/19/2021)	42.5131	50/50	42.5131

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945672	AF1-232 E (Withdrawn : 01/19/2021)	22.8917	50/50	22.8917
946571	AF1-321 C O1	5.8045	50/50	5.8045
946572	AF1-321 E O1	3.8697	50/50	3.8697
957001	AF2-001 C O1	5.8045	50/50	5.8045
957002	AF2-001 E O1	3.8697	50/50	3.8697
957011	AF2-002 C O1	2.9023	50/50	2.9023
957012	AF2-002 E O1	1.9348	50/50	1.9348
957981	AF2-092 C	2.6466	50/50	2.6466
957982	AF2-092 E	1.7644	50/50	1.7644
958101	AF2-104 C (Withdrawn : 12/08/2020)	1.0078	50/50	1.0078
958102	AF2-104 E (Withdrawn : 12/08/2020)	0.6719	50/50	0.6719
958471	AF2-141	2.8370	50/50	2.8370
959792	AF2-270 E	1.4237	50/50	1.4237
960451	AF2-336 C	4.4111	50/50	4.4111
960452	AF2-336 E	2.9407	50/50	2.9407
960461	AF2-337 C	4.4111	50/50	4.4111
960462	AF2-337 E	2.9407	50/50	2.9407
960471	AF2-338 C	4.4111	50/50	4.4111
960472	AF2-338 E	2.9407	50/50	2.9407
960481	AF2-339 C	4.4111	50/50	4.4111
960482	AF2-339 E	2.9407	50/50	2.9407
960901	AF2-381 C	36.2244	50/50	36.2244
960902	AF2-381 E	19.0631	50/50	19.0631
961911	AG1-033 C	1.8864	50/50	1.8864
961912	AG1-033 E	1.0611	50/50	1.0611
961981	AG1-041 C	2.5680	50/50	2.5680
961982	AG1-041 E	1.7120	50/50	1.7120
962292	AG1-077 E	1.6275	50/50	1.6275
962641	AG1-113	1.5117	50/50	1.5117
962651	AG1-114	3.5462	50/50	3.5462
963541	AG1-203 C	2.6447	50/50	2.6447
963542	AG1-203 E	1.4240	50/50	1.4240
963561	AG1-205 C	2.3050	50/50	2.3050
963562	AG1-205 E	1.2412	50/50	1.2412
963881	AG1-241 C	3.8318	50/50	3.8318
963882	AG1-241 E	2.0633	50/50	2.0633
964191	AG1-280 C	2.7077	50/50	2.7077
964192	AG1-280 E	1.8051	50/50	1.8051
964201	AG1-281 C	2.6807	50/50	2.6807
964202	AG1-281 E	1.7871	50/50	1.7871
964751	AG1-338 C	1.4243	50/50	1.4243
964752	AG1-338 E	0.1942	50/50	0.1942
964761	AG1-339 C	1.4891	50/50	1.4891
964762	AG1-339 E	0.1295	50/50	0.1295
964771	AG1-340 C	1.4243	50/50	1.4243
964772	AG1-340 E	0.1942	50/50	0.1942
964911	AG1-355 C	16.4560	50/50	16.4560
964912	AG1-355 E	10.9706	50/50	10.9706
964921	AG1-356 C	8.8787	50/50	8.8787
964922	AG1-356 E	5.9191	50/50	5.9191

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
965881	AG1-457 C	12.2184	50/50	12.2184
965882	AG1-457 E	8.1456	50/50	8.1456
966512	AG1-520 E	1.9348	50/50	1.9348
WEC	WEC	0.0296	Confirmed LTF	0.0296
LGEE	LGEE	0.0647	Confirmed LTF	0.0647
CPL	CPL	0.1037	Confirmed LTF	0.1037
CBM-W2	CBM-W2	0.9856	Confirmed LTF	0.9856
NY	NY	0.1919	Confirmed LTF	0.1919
TVA	TVA	0.1666	Confirmed LTF	0.1666
O-066	O-066	1.1306	Confirmed LTF	1.1306
SIGE	SIGE	0.0284	Confirmed LTF	0.0284
CBM-S2	CBM-S2	1.5034	Confirmed LTF	1.5034
CBM-S1	CBM-S1	0.0441	Confirmed LTF	0.0441
G-007	G-007	0.1711	Confirmed LTF	0.1711
MEC	MEC	0.1589	Confirmed LTF	0.1589
LAGN	LAGN	0.2030	Confirmed LTF	0.2030
CBM-W1	CBM-W1	1.1637	Confirmed LTF	1.1637

11.6.6 Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
166590439	965880	AG1-457 TAP	PENELEC	200746	26ROCKWOOD	PENELEC	1	PN-P7-1-PN-230-001	tower	179.0	107.03	107.49	DC	1.8

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200834	26SW_E13_K22	0.0404	50/50	0.0404
200835	26ARN_Z1-066	-4.1106	Adder	-4.84
200846	26FORWARD	0.1044	50/50	0.1044
200864	K-013 E	4.7966	50/50	4.7966
200888	26HIGHLAND	0.1443	50/50	0.1443
200889	26STNY CRK	0.3137	50/50	0.3137
200925	26R32	0.2262	50/50	0.2262
202225	26SCI_S29B	0.0808	50/50	0.0808
293603	O-018 E	5.8708	50/50	5.8708
294903	P-060 E	9.8259	50/50	9.8259
296332	R-032 E	6.7740	50/50	6.7740
917673	Z2-108 BAT	10.8810	50/50	10.8810
938352	AE1-053 BAT	6.0450	50/50	6.0450
938881	AE1-116	1.2798	50/50	1.2798
938993	AE1-128 C	12.5712	50/50	12.5712
938994	AE1-128 E	8.3808	50/50	8.3808
942361	AE2-249 C	1.4143	50/50	1.4143
942362	AE2-249 E	0.9428	50/50	0.9428
943301	AF1-001 C	-0.8054	Adder	-0.95
944751	AF1-140 C	1.1050	50/50	1.1050
944752	AF1-140 E	0.7367	50/50	0.7367
945671	AF1-232 C (Withdrawn : 01/19/2021)	26.1706	50/50	26.1706
945672	AF1-232 E (Withdrawn : 01/19/2021)	14.0918	50/50	14.0918
946571	AF1-321 C O1	2.5591	50/50	2.5591
946572	AF1-321 E O1	1.7061	50/50	1.7061
957001	AF2-001 C O1	2.5591	50/50	2.5591
957002	AF2-001 E O1	1.7061	50/50	1.7061
957011	AF2-002 C O1	1.2796	50/50	1.2796
957012	AF2-002 E O1	0.8530	50/50	0.8530
957981	AF2-092 C	1.1585	50/50	1.1585
957982	AF2-092 E	0.7723	50/50	0.7723
958101	AF2-104 C (Withdrawn : 12/08/2020)	0.6826	50/50	0.6826
958102	AF2-104 E (Withdrawn : 12/08/2020)	0.4551	50/50	0.4551
958472	AF2-141 BAT	12.0900	50/50	12.0900
959792	AF2-270 E	0.6497	50/50	0.6497
960451	AF2-336 C	1.9308	50/50	1.9308
960452	AF2-336 E	1.2872	50/50	1.2872

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960461	AF2-337 C	1.9308	50/50	1.9308
960462	AF2-337 E	1.2872	50/50	1.2872
960471	AF2-338 C	1.9308	50/50	1.9308
960472	AF2-338 E	1.2872	50/50	1.2872
960481	AF2-339 C	1.9308	50/50	1.9308
960482	AF2-339 E	1.2872	50/50	1.2872
960901	AF2-381 C	16.1695	50/50	16.1695
960902	AF2-381 E	8.5092	50/50	8.5092
961911	AG1-033 C	0.5102	50/50	0.5102
961912	AG1-033 E	0.2870	50/50	0.2870
961981	AG1-041 C	1.0866	50/50	1.0866
961982	AG1-041 E	0.7244	50/50	0.7244
962292	AG1-077 E	0.9841	50/50	0.9841
962641	AG1-113	1.0239	50/50	1.0239
962652	AG1-114 BAT	6.0450	50/50	6.0450
963541	AG1-203 C	1.5991	50/50	1.5991
963542	AG1-203 E	0.8611	50/50	0.8611
963881	AG1-241 C	1.0364	50/50	1.0364
963882	AG1-241 E	0.5581	50/50	0.5581
964191	AG1-280 C	0.4902	Adder	1.09
964192	AG1-280 E	0.3268	Adder	0.73
964201	AG1-281 C	0.4872	Adder	1.08
964202	AG1-281 E	0.3248	Adder	0.72
964751	AG1-338 C	0.5317	50/50	0.5317
964752	AG1-338 E	0.0725	50/50	0.0725
964761	AG1-339 C	0.5559	50/50	0.5559
964762	AG1-339 E	0.0483	50/50	0.0483
964771	AG1-340 C	0.5317	50/50	0.5317
964772	AG1-340 E	0.0725	50/50	0.0725
964911	AG1-355 C	6.5111	50/50	6.5111
964912	AG1-355 E	4.3407	50/50	4.3407
964921	AG1-356 C	5.5797	50/50	5.5797
964922	AG1-356 E	3.7198	50/50	3.7198
965881	AG1-457 C	11.5746	50/50	11.5746
965882	AG1-457 E	7.7164	50/50	7.7164
966512	AG1-520 E	0.8530	50/50	0.8530
G-007A	G-007A	1.0909	Confirmed LTF	1.0909
VFT	VFT	2.9993	Confirmed LTF	2.9993
CALDERWOOD	CALDERWOOD	0.1605	Confirmed LTF	0.1605
PRAIRIE	PRAIRIE	0.7594	Confirmed LTF	0.7594
CHEOAH	CHEOAH	0.1617	Confirmed LTF	0.1617
CBM-N	CBM-N	0.5844	Confirmed LTF	0.5844
COTTONWOOD	COTTONWOOD	0.6489	Confirmed LTF	0.6489
HAMLET	HAMLET	0.1981	Confirmed LTF	0.1981
GIBSON	GIBSON	0.1583	Confirmed LTF	0.1583
BLUEG	BLUEG	0.5086	Confirmed LTF	0.5086
TRIMBLE	TRIMBLE	0.1631	Confirmed LTF	0.1631
CATAWBA	CATAWBA	0.1186	Confirmed LTF	0.1186

11.7 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

Queue Number	Project Name	Status
AA1-144	East Towanda-Grover 230kV	Engineering and Procurement
AA2-000	N/A	N/A
AA2-132	Thompson 34.5kV	Withdrawn
AB1-160	Gold-Sabinsville 115kV	In Service
AB2-092	Bergen 138kV	Partially in Service - Under Construction
AC1-025	Dale Summit	In Service
AD1-154	Timblin 34.5 kV	Active
AD2-055	Moshannon-East Towanda 230 kV	Active
AD2-133	Eagle Valley 115kV	Active
AE1-053	Meyersdale North	Active
AE1-116	Somerset Windpower 23 kV	Active
AE1-123	Emlenton 34.5 kV	Engineering and Procurement
AE1-128	Bedford North-Wills Mounain 115 kV	Active
AE1-147	Bellefonte 46 kV	Engineering and Procurement
AE1-160	Venango 34.5 kV	Engineering and Procurement
AE2-001	Nittany-Zion 46 kV	Active
AE2-055	Shingletown-Boalsburg 46 kV	Suspended
AE2-074	Potter 46 kV	Active
AE2-113	Farmers Valley-Ridgeway 115 kV	Active
AE2-117	ABW Tap-Alexandria 46 kV	Active
AE2-118	ABW Tap-Williamsburg 46 kV	Active
AE2-120	Graymont-Zion 46 kV	Active
AE2-121	Milesburg-Tanney Junction 46 kV	Active
AE2-126	Dubois-Curwensville 34.5 kV	Engineering and Procurement
AE2-129	Philipsburg-Clarence 34.5 kV	Engineering and Procurement
AE2-131	Philipsburg-Karthaus 34.5	Suspended
AE2-139	East Towanda-Grover 230 kV	Active
AE2-224	Bearrock-Johnstown 230 kV	Active
AE2-248	Fillmore-Thompson Farm 46 kV	Active
AE2-249	Bedford North-Pennsylvania Hollow 23 kV	Engineering and Procurement
AE2-262	Moshannon-Milesburg 230 kV	Active
AE2-263	Moshannon-Milesburg 230 kV	Active
AE2-264	Altoona-Raystown 230 kV	Active
AE2-299	Erie East 230 kV	Active
AE2-316	Brookville-Squab Hollow 138 kV	Active
AE2-344	Edinboro South-Venango Junction 115 kV	Active
AF1-001	Thayerville 34.5 kV	Engineering and Procurement
AF1-006	Fairview East 34.5 kV	Active
AF1-039	Listonburg-Highpoint 24.9 kV	Active

Queue Number	Project Name	Status
AF1-043	Moshannon-East Towanda 230 kV	Active
AF1-068	Boalsburg-Centre Hall 46 kV	Withdrawn
AF1-086	Madera-Westover South 115 kV	Active
AF1-094	Union City-Cambridge Springs 34.5 kV	Active
AF1-096	Titusville-Oil Creek 34.5 kV	Active
AF1-098	Four Mile Jct-Corry East 115 kV	Active
AF1-099	Moshannon-Milesburg 230 kV	Active
AF1-100	Shawville-Moshannon 230 kV	Active
AF1-103	Warren 34.5 kV	Active
AF1-106	East Sayre 34.5 kV	Active
AF1-112	Centre Hall-Boalsburg 46 kV	Active
AF1-132	Shingletown-Boalsburg 46 kV	Withdrawn
AF1-134	Philipsburg-Madera 34.5 kV	Active
AF1-140	Claysburg 23 kV	Engineering and Procurement
AF1-142	Moshannon-Milesburg 230 kV	Active
AF1-143	Lick Run 115 kV	Active
AF1-153	Motion-Ridgeway 46 kV	Active
AF1-155	Paper City-Wilcox 46 kV	Engineering and Procurement
AF1-167	West Freedom-C&K Coal 25 kV	Active
AF1-170	Springboro-Venango Junction 115 kV	Active
AF1-210	Burma 23 kV	Engineering and Procurement
AF1-214	Nittany-Zion 46 kV	Withdrawn
AF1-217	Edinboro -Cambridge Springs 34.5 kV	Active
AF1-232	Allegheny-Somerset 115 kV	Withdrawn
AF1-240	Timblin 34.5 kV	Active
AF1-272	Lucerne 115 kV	Active
AF1-276	Lewis Run-Pierce Brook 230 kV	Active
AF1-277	Lewis Run-Pierce Brook 2 230 kV	Active
AF1-278	Lewis Run-Pierce Brook 3 230 kV	Active
AF1-286	East Sayre 34.5 kV II	Active
AF1-287	Edinboro South 34.5 kV II	Active
AF1-302	Brookville-Squab Hollow 138 kV	Active
AF1-304	Titusville-Grandview 115 kV	Active
AF1-306	Squab Hollow 230 kV	Active
AF1-321	Hooversville 115 kV I	Active
AF2-001	Hooversville 115 kV II	Active
AF2-002	Hooversville 115 kV III	Active
AF2-010	Union City-Titusville 115 kV	Active
AF2-039	Shawville-Clearfield 34.5 kV	Active
AF2-045	Cambria Nug 115 kV	Engineering and Procurement
AF2-050	Bearrock-Johnstown 230 kV	Active
AF2-051	Geneva 115 kV	Active
AF2-087	East Altoona-Pinecroft 12.47 kV	Suspended
AF2-088	Shawville-Clearfield 34.5 kV II	Active
AF2-092	Snake Spring-Bedford Area 23 kV	Active
AF2-104	Somerset 23 kV	Withdrawn
AF2-121	Philipsburg-Shawville 34.5 kV	Active
AF2-130	Wolfs Corners 34.5 kV	Active
AF2-141	Lick Run 115 kV	Active
AF2-164	Handsome Lake 345 kV	Active
AF2-165	Clark Summit-Emlenton 34.5 kV	Active
AF2-166	Clark Summit-Emlenton 34 kV	Active

Queue Number	Project Name	Status
AF2-197	East Towanda 115 kV	Active
AF2-235	Titusville-Oil Creek 34.5 kV	Active
AF2-238	Mansfield-South Troy 34.5 kV	Active
AF2-239	Wyalusing-Hollenback WRC 34.5 kV	Active
AF2-240	North Orwell 12.47 kV	Active
AF2-241	Athens-Milan 34.5 kV	Active
AF2-243	Clark Summit 34.5 kV	Active
AF2-265	South Troy-Athens 34.5 kV	Active
AF2-270	Bedford South RCB-Bedford Area 23 kV	Engineering and Procurement
AF2-271	Pemberton-Sinking Valley 12.47 kV	Engineering and Procurement
AF2-273	Sligo 25 kV	Engineering and Procurement
AF2-293	Beech Creek 12.47 kV	Active
AF2-294	Thompson 34.5 kV	Active
AF2-295	Wilcox-Paper City 46 kV	Active
AF2-296	Madera 34.5 kV	Active
AF2-318	East Towanda-New Albany 34.5 kV	Active
AF2-336	Snake Spring 115 kV I	Active
AF2-337	Snake Spring 115 kV II	Active
AF2-338	Snake Spring 115 kV III	Active
AF2-339	Snake Spring 115 kV IV	Active
AF2-381	Bedford North-Central City West 115 kV	Active
AF2-405	East Sayre 34.5 kV III	Active
AF2-406	Sayre 115 kV	Active
AF2-411	Mainesburg 345 kV	Withdrawn
AF2-412	Mainesburg 115 kV	Active
AG1-033	Scalp Level 23 kV	Active
AG1-040	Morgan Street-Mount Hope 34.5 kV	Active
AG1-041	Osterburg-Bedford North 23 kV	Active
AG1-077	Allegheny Tunnel 23 kV	Active
AG1-090	Philipsburg 115 kV	Active
AG1-100	Venango-Saegertown 34.5 kV	Active
AG1-113	Somerset Windpower 22.86 kV	Active
AG1-114	Meyersdale North 115 kV	Active
AG1-138	Wolfs Corners 34.5 kV	Active
AG1-139	Clark Summit-Emlenton 34.5 kV	Active
AG1-140	Union City 34.5 kV	Active
AG1-144	Phillipsburg 34.5 kV	Active
AG1-177	Union City 34.5 kV	Active
AG1-193	Utica Junction 34.5 kV	Active
AG1-197	Morgan Street-Cochranton 34.5 kV	Active
AG1-198	Union City 34.5 kV	Active
AG1-202	Springboro 12.47 kV	Active
AG1-203	Reels Corner 23 kV	Active
AG1-205	Rockwood 23 kV	Active
AG1-206	Snyder Twp 34.5 kV	Active
AG1-241	Scalp Level 23 kV	Active
AG1-242	Beccaria 34.5 kV	Active
AG1-247	North Orwell 12.47 kV	Active
AG1-253	Erie East-Union City 34.5 kV	Active
AG1-257	Madisonburg Jct-Millheim 46 kV	Active
AG1-258	Madisonburg Jct-Millheim 46 kV	Active
AG1-280	Claysburg-Puzzletown 46 kV	Active

Queue Number	Project Name	Status
AG1-281	Claysburg-HCR Tap 46 kV	Active
AG1-295	Blairsville East 23 kV	Active
AG1-296	Snyder Township 34.5 kV	Active
AG1-301	Miller REC-Warrior Ridge 46 kV	Active
AG1-303	Geneva 115 kV	Active
AG1-308	Shawville-Philipsburg 115 kV	Active
AG1-333	Lake Como-Pine Mills 12.47 kV	Active
AG1-338	Curryville-RKB-Yellow Creek 23 kV I	Active
AG1-339	Curryville-RKB-Yellow Creek 23 kV II	Active
AG1-340	Curryville 23 kV	Active
AG1-355	Scalp Level-Hooversville 115 kV	Active
AG1-356	Somerset-Allegheny 115 kV	Active
AG1-377	Philipsburg 115 kV	Active
AG1-378	Philipsburg 115 kV	Active
AG1-382	SGC Tap-Reese REC 46 kV	Active
AG1-385	Motion-Ridgeway 46 kV	Active
AG1-387	Beth 33-Lilly 46 kV	Active
AG1-389	Gold 115 kV I	Active
AG1-390	Gold 115 kV II	Active
AG1-391	Gold 115 kV III	Active
AG1-392	Gold 115 kV IV	Active
AG1-395	Philipsburg-Karthaus 34.5 kV 2	Active
AG1-455	Springboro-Venango Junction 115 kV	Active
AG1-457	Somerset-Rockwood 115 kV	Active
AG1-481	Warren 34.5 kV	Active
AG1-520	Hooversville-Rockingham 23 kV	Active
AG1-548	Erie South-Union City 115 kV	Active
AG1-549	Shelocta 115 kV	Active
V3-030	St. Benedict-Patton 46kV	In Service
Y1-033	Penn Mar-Rock Wood 115kV	In Service
Z1-066	Arnold 34.5kV	In Service
Z1-069	Gold-Sabinsville 115kV	In Service
Z2-108	Meyersdale North 115kV	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
PN-P1-2-PN-115-074-A	CONTINGENCY 'PN-P1-2-PN-115-074-A' /* ALLEGHENY - SOMERSET 115KV DISCONNECT BRANCH FROM BUS 200744 TO BUS 202637 CKT 1 /* 26SOMERST 115 26PRIDE 115 DISCONNECT BRANCH FROM BUS 202637 TO BUS 964920 CKT 1 /* 26PRIDE 115 AG1- 356 TAP 115 END
PN-P1-2-PN-115-082	CONTINGENCY 'PN-P1-2-PN-115-082' /* HILLTOP - KRAYN - RACHEL HILL 115KV DISCONNECT BRANCH FROM BUS 200878 TO BUS 200790 CKT 1 /* 26KRAYN 115 26SALIX 115 DISCONNECT BRANCH FROM BUS 200790 TO BUS 200751 CKT 1 /* 26SALIX 115 26HILLCLAY 115 DISCONNECT BRANCH FROM BUS 200751 TO BUS 200752 CKT 1 /* 26HILLCLAY 115 26HILLTOP 115 DISCONNECT BRANCH FROM BUS 200751 TO BUS 200749 CKT 1 /* 26HILLCLAY 115 26RACHEL H 115 DISCONNECT BRANCH FROM BUS 200790 TO BUS 200785 CKT 1 /* 26SALIX 115 26SALIX 23 DISCONNECT BRANCH FROM BUS 200749 TO BUS 200784 CKT 1 /* 26RACHEL H 115 26RACHEL#1 23 DISCONNECT BUS 200790 /* 26SALIX 115 DISCONNECT BUS 200751 /* 26HILLCLAY 115 END

Contingency Name	Contingency Definition
AP-P7-1-WPP-138-53A	CONTINGENCY 'AP-P7-1-WPP-138-53A' /* 38 DISCONNECT BRANCH FROM BUS 235132 TO BUS 235825 CKT 1 /* 01AL 4 138 01ALL L4T 138 DISCONNECT BRANCH FROM BUS 235132 TO BUS 235742 CKT 4E /* 01AL 4 138 01ALL L4 25 DISCONNECT BRANCH FROM BUS 235132 TO BUS 235742 CKT 4W /* 01AL 4 138 01ALL L4 25 DISCONNECT BRANCH FROM BUS 235134 TO BUS 235139 CKT 1 /* 01AL&D6T 138 01AL&D6T 138 DISCONNECT BRANCH FROM BUS 235138 TO BUS 235139 CKT 1 /* 01AL 4J 138 01AL&D6T 138 DISCONNECT BRANCH FROM BUS 235138 TO BUS 235079 CKT 1 /* 01AL 4J 138 01SPGD 138 DISCONNECT BRANCH FROM BUS 235138 TO BUS 235825 CKT 1 /* 01AL 4J 138 01ALL L4T 138 DISCONNECT BRANCH FROM BUS 235139 TO BUS 235204 CKT 1 /* 01AL&D6T 138 01KITTAN 138 DISCONNECT BRANCH FROM BUS 235121 TO BUS 235282 CKT 1 /* 01ARMSTR 138 01GAR RN 138 DISCONNECT BRANCH FROM BUS 235202 TO BUS 235240 CKT 1 /* 01KISKIV 138 01COLMBGPN 138 DISCONNECT BRANCH FROM BUS 235240 TO BUS 235282 CKT 1 /* 01COLMBGPN 138 01GAR RN 138 DISCONNECT BRANCH FROM BUS 235204 TO BUS 235282 CKT 1 /* 01KITTAN 138 01GAR RN 138 END
PN-P2-3-PN-115-35G	CONTINGENCY 'PN-P2-3-PN-115-35G' /* #9 STUCK BREAKER AT HOOVERSVILLE DISCONNECT BRANCH FROM BUS 200743 TO BUS 200796 CKT 3 /* 26HOOVERSV 115 26HOOVERSVL 230 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200836 CKT 1 /* 26HOOVERSV 115 26STATHILL 115 END
Base Case	
PN-P7-1-PN-230-001	CONTINGENCY 'PN-P7-1-PN-230-001' /* HOMER CITY - HOOVERSVILLE 230KV & SEWARD - TOWER 51 115KV DISCONNECT BRANCH FROM BUS 200767 TO BUS 200768 CKT 1 /* 26HOMER CT 230 26QUEMAHON 230 DISCONNECT BRANCH FROM BUS 200768 TO BUS 200796 CKT 1 /* 26QUEMAHON 230 26HOOVERSVL 230 DISCONNECT BRANCH FROM BUS 200796 TO BUS 200743 CKT 3 /* 26HOOVERSVL 230 26HOOVERSV 115 DISCONNECT BRANCH FROM BUS 200741 TO BUS 200742 CKT 1 /* 26SEWARD 115 26TOWER 51 115 END

Contingency Name	Contingency Definition
PN-P2-2-PN-115-074	CONTINGENCY 'PN-P2-2-PN-115-074' /* HOOVERSVILLE #3 115KV BUS FAULT DISCONNECT BRANCH FROM BUS 200743 TO BUS 200836 CKT 1 /* 26HOOVERSV 115 26STATHILL 115 DISCONNECT BRANCH FROM BUS 200796 TO BUS 200743 CKT 3 /* 26HOOVERSVL 230 26HOOVERSV 115 END

12 Short Circuit Analysis

The following Breakers are overdutied:

None

13 Affected Systems

13.1 NYISO

NYISO Impacts to be determined during later study phases (as applicable).

13.2 MISO

MISO Impacts to be determined during later study phases (as applicable).

14 Attachment 1: One Line Diagram